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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/076,097	02/15/2002	Soo Chang Chang	041501-5494	9123

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EXAMINER

MCDONALD, RODNEY GLENN

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 03/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/076,097

Applicant(s)

Chang

Examiner

Rodney McDonald

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The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.

If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.

If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.

Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on _____
- 2a) This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some* c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) Interview Summary (PTO-413) Paper No(s): |
| 2) Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) Notice of Informal Patent Application (PTO-152) |
| 3) Information Disclosure Statement(s) (PTO-1449) Paper No(s): | 6) Other: |

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DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Potter (U.S. 5,262,030).

Potter teach that in conventional or prior art sputtering system a chamber is evacuated for sputter coating with a substrate held by a substrate holder means 14. The material with which the substrate is to be coated is fabricated into a target 15. This target forms part of the chamber walls and is insulated from the walls by means 16 and maintained at a suitable negative potential by a power supply 17. A magnetic field 18 which is substantially parallel to the target on the side of the target facing the substrate is generated by an electromagnet comprised of a yoke of magnetizable material 19 and a coil 20. An undesirable characteristic of prior art magnetrons is that the target is eroded more rapidly in regions where the magnetic field is more intense.

(Column 1 lines 47-68; Column 2 lines 1-5)

Potter then goes on to teach that his invention is an attempt to improve the prior art by providing a method and means (i.e. electromagnetic coils (see below)) for obtaining more efficient target utilization by being able to vary the location of the magnetic field through external electrical

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means, and thereby spread the target erosion more uniformly over the surface of the target.

(Column 3 lines 1-8)

In accordance with Potter's invention, the magnetic field and associated plasma produced in a magnetron sputter coating system are electrically moved across the face of a suitable large target while the substrates are stationary. The novel apparatus provides a means of creating arbitrary two-dimensional plasma patterns. Specialized versions provide sufficient flexibility for many applications. Examples of specialized versions with one degree of freedom are cathodes in which a plasma of fixed shape may be translated along one axis only, and cathodes where the center of the pattern is fixed but the size of the pattern may be varied. *The magnetic structure of the sputter coating apparatus is formed as a backplane of magnetically soft material onto which a large number of poles of magnetically soft material are affixed, and a large number of current carrying coils oriented parallel to that backplane and encompassing one or more of the poles. The plasma is controlled by selectively energizing these coils using a computer or other control means.* Specific and practical examples of this structure will be described. (Column 3 lines 22-42)

In one application a cathode with two degrees of freedom has the shape of a large rectangle or square and is approximately the size of the pallets used in existing disk sputtering machines. (Column 4 lines 43-46)

Nearly continuous translation of a given field distribution can be achieved by selective activation of the appropriate "magnetic pixels" in analogy with the cathode ray tube image.

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The resolution achievable is dependent on the "magnetic pixel" density. Adequate resolution for sputtering purposes is achievable with commercially viable techniques. (Column 4 lines 16-22)

The third and most general class of cathodes to be described which incorporate the features of this invention includes those devices in which the magnetic field may be varied in two dimensions. The requirement for such a device is that it be capable of producing an arbitrary magnetic scalar potential on the plane 21 previously used to describe the operation of the more specialized embodiments. *For practical purposes, it is sufficient to partition the plane 21 into a number of elements, where each element is small relative to the distance to the region where the magnetic field is to be used, and to provide a means for controlling the potential of each element. FIG. 10 shows the plane 21 partitioned into elements 50 having a square shape. Another example consisting of circular elements 50 arranged in a hexagonal pattern is shown in FIG. 11.* (Column 7 lines 28-43)

The design shown in cross-sectional view in FIG. 12A is one means of generating the desired arbitrary potential. It consists of a baseplate 51 to which are attached a number of poles 52 of diameter d , arranged in *a hexagonal pattern* with lattice constant D . The baseplate and poles are made of a magnetic material such as Carpenter High Permeability 49 alloy. Each pole is surrounded by *a coil 53*, with leads 54 brought through a suitable hole in the baseplate. The poles 52 project through and are sealed to *a plate 55* of nonmagnetic material such as copper. *Plate 55* is parallel to baseplate 51 and provides a means of confining a flow of cooling water across the

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back surface of the target 15. Shown in plan view in FIG. 12B is the plane 21 which is convenient for describing the operation of the cathode. Plane 21 is coincident with the plane containing the ends of all the poles 52. (Column 7 lines 44-60)

From Figures 11 and Figures 12A and 12B the examiner understands that there are at least one and two groups of coils which will trace a hexagonal pattern and a triangular patterns by connecting the coils by imaginary lines and that each of the coils are selectable energizable as discussed above for energizing whichever magnets or groups of magnets are necessary in order to achieve uniform target utilization. (See Figures 11, 12A and 12B and discussion about selective energization of coils above)

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Potter (U.S. Pat. 5,262,030).

Potter is discussed above and all is as applies above. (See Potter discussed above)

The differences not yet discussed is providing at least two groupings of electromagnets with triangular, pentagonal and hexagonal shapes (this difference statement is made if Applicant

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disagrees with the Examiner's interpretation of the grouping of electromagnets under 35 U.S.C. 102 rejection above.)

As discussed above from Figures 11 and Figures 12A and 12B the examiner understands that there are at least one and two groups of coils which will trace a hexagonal pattern and a triangular patterns by connecting the coils by imaginary lines and that each of the coils are selectable energizable as discussed above for energizing whichever magnets or groups of magnets are necessary in order to achieve uniform target utilization. (See Figures 11, 12A and 12B and discussion about selective energization of coils above)

The motivation for providing different groupings of magnets separately energizable is that it allows for more uniform erosion over the surface of the target. (Column 3 lines 3-8)


Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Potter by utilizing at least two groups of magnets in certain geometrical positions as taught by Potter because it allows for performing more uniform erosion over the surface of the target.

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5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney McDonald whose telephone number is 703-308-3807. The examiner can normally be reached on M-Th from 8 to 5:30. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen, can be reached on (703) 308-3322. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



RODNEY G. McDONALD
PRIMARY EXAMINER

RM

March 3, 2003